REMARKS

The present invention was filed on October 12, 2001, with claims 1-24. With this response, Applicants propose to amend claims 1 and 19, and to add claim 25. Claim 25 is supported by, *inter alia*, FIGS. 4, 8, and 10 and associated text of the present specification. The Examiner has withdrawn claims 15-18 and 20-24 from consideration. Consequently, claims 1-14, 19, and 25 are pending. In the outstanding Office Action, the Examiner required restriction of claims, requested a copy of a reference, objected to the drawings, objected to the claims, rejected claims 1-14 under 35 USC §112, rejected claims 1-3 under 35 USC §102(e), and rejected claims 4-14 and 19 under 35 USC §103(a).

Restriction Requirement

In the outstanding Office Action, the Examiner required restriction of the application to one of the following two groups of claims: Group I, including claims 1-14 and 19; Group II, including claims 15-18; and Group III, including claims 20-24.

However, Applicants respectfully assert that the restriction requirement is improper and should be withdrawn, since each Group is generally related to techniques for encoding and decoding using N-parallel encoders or decoders, respectively, and it is believed that a complete search for each Group would require a search of a few subclasses of a single class. The Examiner has stated that the three Groups are each in class 714, and that subclasses 785, 757, and 776 are the respective subclasses for the Groups. Therefore, the Examiner would not be overly burdened by searching these groups, as there are only three subclasses of a single class to search. Accordingly, Applicants submit that an examination of Groups I-III would not impose a serious burden on the Examiner. Where, as here, "the search and examination of an entire application can be made without serious burden, the Examiner must examine it on the merits, even though it includes claims to independent or distinct inventions." MPEP §803.

Accordingly, it is respectfully requested that the restriction requirement be reconsidered and withdrawn and that all of the pending claims in the application be examined together in this application. Alternatively, Applicants respectfully select Group I, claims 1-14 and 19, for prosecution on the merits.

Reference Request

The Examiner requested a copy of the reference entitled Mastrovito, "VLSI designs for multiplication over finite fields $GF(2^m)$," Int'l Conf. on Applied Algebra, Algebraic Algorithms, and Error-Correcting Codes, 297-309, Rome, July 1988 (hereinafter, "Mastrovito"). Applicants have filed an Information Disclosure Statement citing Mastrovito and have supplied this reference.

Objections to Drawings

The Examiner objected to the drawings because of the following: (1) the reference "220" in the description was not in the drawings; (2) the reference 375 in the drawings was not used in the description; and (3) the "drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character '470' in Figure 3 has been used to designate the same signal line" (see page 6, bottom paragraph of outstanding Office Action).

Regarding (1), the as-filed drawings contained the reference "220" in FIG. 2, but the subsequently submitted formal drawings did not. With this response, Applicants submit corrected formal drawings containing the reference 220.

Regarding (2), Applicants have amended the disclosure to state, "[t]he FEC encoder 370 comprises a plurality of three-parallel encoders, which are shown in more detail below, and outputs 375" (emphasis added). This amendment is supported, *inter alia*, by page 35, lines 20-22 ("The FEC encoder 370 comprises inputs c111_otx, r111_otx, d111tx_otx, and p111tx_otx and outputs d111tx_fco, and p111tx_fco") and FIG. 18.

Regarding (3), 37 CFR §1.84(p)(4), states, "[t]he same part of an invention appearing in more than one view of the drawing must always be designated by the same reference character, and the same reference character must never be used to designate different parts."

Applicants respectfully submit that reference 470 meets the requirements of 37 CFR §1.84(p)(4). In decoder module 310, the "[d]eserializer 315 converts the incoming serial data stream into a parallel data stream 470." See page 14, lines 25-26 of

the present specification. In the encoder module 350, "[t]he synchronizer and signal processor 380 creates appropriate clock signals for the serializer 390 and also packages the input data into a three-parallel frame 400. Serializer 390 converts the three-parallel frame 400 into a serial bit stream entitled 'output data' in FIG. 3." In FIG. 4, Applicants show a three-parallel frame 400 and the parallel data stream 470, as data bus 470, in FIG. 4. FIG. 4 shows that the data bus is 48 bytes wide.

Thus, reference 470 is used in FIGS. 3 and 4 to describe a parallel data stream that is 48 bytes wide. Applicants respectfully submit that the same "part" is being described by reference 470 in FIGS. 3 and 4 and, consequently, that reference 470 meets the requirements of 37 CFR §1.84(p)(4).

In light of the foregoing, Applicants respectfully request that the objections to the drawings be withdrawn.

Objection to Claims 1-14 and 19

The Examiner objected to claims 1-14 and 19 and requested clarification of claims 1 and 19. In particular, the Examiner asserted "that a plurality of N-parallel syndrome generators operating in parallel is just a plurality of parallel syndrome generators, for example k N-parallel syndrome generators, whereby each of the N-parallel syndrome generators is coupled to a parallel data stream and is adapted to perform a calculation each cycle with N symbols, is kxN parallel syndrome generators adapted to perform a calculation each cycle with kxN symbols." See outstanding Office Action, page 7, section 3.

Applicants respectfully disagree. MPEP §2164.08 states that "[w]hen analyzing the enabled scope of a claim, the teachings of the specification must not be ignored because claims are to be given their broadest reasonable interpretation that is consistent with the specification." Applicants respectfully submit that the claim changes suggested by Examiner are inconsistent with the specification.

For example, in FIG. 8, Applicants show an exemplary 3-parallel syndrome generator 800, which couples to three symbols (e.g., r_0, r_1, and r_2) of a parallel data stream (not shown in FIG. 8) and which produces syndromes, S_i. On page 22, lines 26-27 of the disclosure, it states, "[e]ach three-parallel syndrome generator 800

determines syndromes for three bytes of one codeword." Furthermore, at page 23, lines 28-30, Applicants state that "[a] reason for using 3-parallel processing is to avoid use of faster clock (about 335 MHz instead of about 112 MHz) which is expensive, less reliable and difficult to implement with current technology."

Applicants respectfully submit that the term "N-parallel syndrome generator" in independent claim 1 and the term "N-parallel decodings" in independent claim 19, when read in light of the specification, are correct and no clarification is required.

Consequently, Applicants respectfully request the objection to claims 1-14 and 19 be withdrawn.

Rejection of Claims 1-14 under 35 USC §112

The Examiner rejected claims 1-14 under 35 USC §112, second paragraph, as being indefinite.

First, the Examiner asserted that the limitation in claim 1 of "N-parallel generators" has insufficient antecedent basis. Applicants respectfully disagree. Nonetheless, Applicants have amended the claim to replace the term in question with the term --N-parallel syndrome generators--. Consequently, Applicants respectfully request that this rejection be withdrawn.

Second, the Examiner asserted that claim 1 recites "adapted to use the at least one error polynomial," and "[s]ince the term 'adapted' leaves optional the 'use the at least one error polynomial', it is not clear whether the 'at least one error polynomial' is used, which renders the claim language indefinite." The Examiner rejected claims 3, 4, and 6-8 for the same reason, and rejected dependent claims 2 and 9-14 because these claims inherit the deficiencies of independent claim 1.

Applicants would like to point out that the Court of Customs and Patent Appeals, the predecessor to the Federal Circuit, has explicitly held that "adapted to" clauses and similar claim terms are permissible, and do not render a claim indefinite under §112, second paragraph. In re Venezia, 189 USPQ 149, (CCPA 1976).

Furthermore, a proper analysis under §112, second paragraph, must look at the claim as a whole to determine if the claim particularly points out and distinctly

claims the subject matter that is regarded as the invention. If a given claim "define[s] the metes and bounds of the claimed invention with a reasonable degree of precision and particularity, . . . [it is] definite as required by the second paragraph of section 112." Id., at 151. Each of claims 1-14 is believed to meet this statutory requirement.

For instance, independent claim 1 claims a decoder and contains a clause of "each N-parallel error correction and determination device . . . being adapted to use the at least one error polynomial produced by the one key equation determination device to correct errors in the parallel data stream." This clause limits the claim to a particular structure, which is one where each N-parallel error correction and determination device is adapted to use the at least one error polynomial, regardless of whether the at least one error polynomial is used. In other words, the clause creates a specific limitation, which is one where a decoder contains a number of N-parallel error correction and determination devices, and each N-parallel error correction and determination device is adapted to use the at least one error polynomial.

The "adapted to" clauses in claims 3, 4 and 6-8 are similar and also claim particular structures. For example, claim 3 contains the clause of "further comprising a device adapted to convert a serial input data stream into the parallel data stream." Therefore, claim 3 claims a structure having a device adapted to convert a serial input data stream into the parallel data stream, regardless of whether the serial input data stream is actually converted to a parallel data stream.

Consequently, Applicants respectfully submit that the "adapted to" clauses in independent claims 1, 3, 4, and 6-8 claim particular structures and are therefore definite limitations. Applicants respectfully request the rejections to claim 1-14 be withdrawn.

Rejection of Claims 1-3 under 35 USC §102(e)

In the outstanding Office Action, the Examiner rejected claims 1-3 under 35 USC §102(e) as being anticipated by Chen, U.S. Patent No. 6,571,368 (hereinafter, "Chen"). The Examiner asserted that FIG. 6 of Chen teaches kxN syndrome generators and asserted that "a plurality of N-parallel syndrome generators operating in parallel is just a plurality of parallel syndrome generators."

Applicants respectfully disagree. In independent claim 1, Applicants claim "a plurality of N-parallel syndrome generators, each of the N-parallel syndrome generators coupled to a parallel data stream and being adapted to perform a calculation each cycle with N symbols from the parallel data stream." This limitation indicates that each N-parallel syndrome generator can perform a calculation each cycle with N symbols from the parallel data stream. A 3-parallel syndrome generator is shown, for instance, in FIG. 8 of the present specification.

Each "syndrome calculation cell" in Chen uses one symbol, r_j, in a calculation. See FIG. 7 and col. 9, line 43 to col. 10, line 3 of Chen. By contrast, the present invention has the limitation of "each of the N-parallel syndrome generators . . . being adapted to perform a calculation each cycle with N *symbols* from the parallel data stream" (emphasis added). Chen does not disclose or imply an N-parallel syndrome generator that is adapted to perform a calculation each cycle with N *symbols* from the parallel data stream, as claimed in independent claim 1.

Therefore, Applicants respectfully submit that independent claim 1 is patentable over Chen.

Moreover, Applicants have amended independent claim 1 to add the limitations of "each N-parallel syndrome generator adapted to determine, after a predetermined number of cycles, a plurality of syndromes" and "each key equation determination device . . . being adapted to determine at least one error polynomial by using a corresponding plurality of syndromes from the at least one N-parallel syndrome generator" (emphasis added). These amendments are supported, *inter alia*, by page 22, line 23 to page 23, line 23 of the present disclosure.

As described above, each "syndrome calculation cell" in Chen determines a single syndrome and therefore does not disclose or imply "each N-parallel syndrome generator adapted to determine, after a predetermined number of cycles, a plurality of syndromes," as claimed in amended independent claim 1.

For the reasons given above, Applicants respectfully submit that independent claim 1 is patentable over Chen.

In rejecting claims 2-14 and 19, the Examiner also cited Yun, U.S. Patent No. 5,526,368 (hereinafter, "Yun"), White, U.S. Patent No. 5,754,563 (hereinafter, "White"), and Mastrovito.

Applicants read White as having a "syndrome generator 302" that accepts a "received word/polynomial r(x)" and produces a "syndrome word/polynomial S(x)" (see FIG. 3 and col. 8, lines 16-26 of White). Additionally, White also discloses a number of "syndrome byte generators 314" as shown in FIG. 4 of White and described at col. 8, lines 47-57 of White. However, there is no indication in White of "a plurality of N-parallel syndrome generators, each of the N-parallel syndrome generators coupled to a parallel data stream and being adapted to perform a calculation each cycle with N symbols from the parallel data stream, each N-parallel syndrome generator adapted to determine, after a predetermined number of cycles, a plurality of syndromes," as recited in independent claim 1.

For example, the syndrome generator 302 of White is a single syndrome generator and therefore is not "a plurality of N-parallel syndrome generators." If each syndrome byte generator 314 of White is considered, for sake of argument, to be an "N-parallel syndrome generator" in accordance with independent claim 1, then each syndrome byte generator 314 of White produces only one syndrome (see FIG. 4 of White) and therefore does not meet the limitation of "each N-parallel syndrome generator adapted to determine, after a predetermined number of cycles, a plurality of syndromes," as recited in independent claim 1.

Further, neither Yun nor Mastrovito discloses or implies "each N-parallel syndrome generator adapted to determine, after a predetermined number of cycles, a plurality of syndromes," as recited in independent claim 1.

Consequently, Applicants respectfully submit that independent claim 1 is patentable over Chen, While, Yun, and Mastrovito, alone or in any combination. Because independent claim 1 is patentable, dependent claims 2 and 3, which depend from and include all limitations of independent claim 1, are also patentable. Applicants request the rejection of claims 1-3 under 35 USC §102(e) be withdrawn.

Rejection of Claims 4-14 and 19 under 35 USC §103(a)

In the outstanding Office Action, the Examiner rejected claims 4-14 and 19 under 35 USC §103(a) using combinations of various references including Yun, White, and Mastrovito.

In particular, the Examiner asserted that independent claim 19 was unpatentable over Chen in view of White. Applicants have amended independent claim 19 to include the limitations of "performing a plurality of N-parallel syndrome generations using the parallel data stream, each of the N-parallel syndrome generations determining, after a predetermined number of cycles, a plurality of syndromes" and "performing, in parallel and by using each of the plurality of syndromes generated by each of the plurality of N-parallel syndrome generations" (emphasis added). These amendments are supported, for example, by page 22, line 23 to page 23, line 23 of the present disclosure.

As described above in reference to claim 1, White does not teach or imply "performing a plurality of N-parallel syndrome generations using a parallel data stream, each of the N-parallel syndrome generations determining, after a predetermined number of cycles, a plurality of syndromes," as recited in independent claim 19. Further, neither Yun nor Mastrovito teaches or implies this limitation.

Consequently, Applicants respectfully submit that amended claim 19 is patentable over Chen, White, Yun, and Mastrovito, alone or in combination.

Moreover, because independent claim 1 is patentable, dependent claims 4-14, which include all limitations of independent claim 1 from which these claims depend, are also patentable.

New Claim 25

Claim 25 has been added and support for this claim appears, for instance, at FIGS. 4, 8, and 10 and associated text of the present specification. No new material has been added.

Because independent claim 1 is patentable over the cited art, alone or in combination, new claim 25, which includes all limitations of independent claim 1 from which this claim depends, is also patentable.

Conclusion

Applicants respectfully submit that claims 1-14, 19, and 25 are patentable over the cited art, alone or in combination. The Examiner's attention to this matter is appreciated.

Respectfully submitted,

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